Hospital Information Systems: the challenge of a distributed scenario

Beatriz de F. Leão, MD, PhD(1,2); José M. V.de Castilho, MSc, PhD(2); Pablo J. Madril,Eng(1); Daniel Sigulem, MD, PhD(1)
(1) Health Informatics Center - Federal University of São Paulo- Escola Paulista de Medicina
(2) Institute of Informatics - Federal University of Rio Grande do Sul, Brazil

As the number of medical data stored in digital media increases, the need of integration of these different application is mandatory. Presently, at least in Brazil, most hospitals have to deal with a diversity of applications using different technologies and hardware platforms. Due to a lack of commercial products for hospital information systems (HIS) in Brazil, most academic hospitals chose to develop their own systems, several years ago. By then the best solution was to work in a mainframe environment. Systems that cannot communicate in an open architecture, therefore, coexist with more recent technologies, such as client-server applications supporting specific departmental needs. The Hospital of São Paulo/ Federal University of São Paulo is now facing the challenge to integrate different applications into a unique hospital information system. Two hundred ASCII terminals connected to a mainframe offer the basic hospital information systems (HIS) functionality to the 800 bed hospital, outpatient clinic (4 blocks around the main hospital building) and the emergency ward. The HIS provides some support for patient care, however it is mostly driven to the administrator needs. For this reason, several local area networks (LAN) in different departments developed their own systems, creating many data repositories that replicate in part what is stored in the mainframe. The great majority of these applications use an open format to store their data: DBF or Access files. Besides the ASCII terminals, about 300 PCs are linked in the academic University network, offering electronic mail, and WEB access and courseware's.
The main challenge now is to build a distributed relational database application in a client-server architecture, taking into account what already exists in the Institution either in the mainframe environment or in the LAN. Besides that, the new integrated environment should incorporate the state of the art intelligent databases methodologies in order to transparently offer alerts and guidelines to the system users. The premises adopted for this project are: utilization of object oriented methodology to model the entire application and database (Rumbaugh's OMT); mapping of the object oriented model to the relational model through a software layer on top of the RDBMS (Persistence and a locally developed MSc dissertation that implements objects persistence in RDMS are under evaluation); utilization of a medical thesaurus to map different controlled vocabularies, whenever possible mapping them to international standards such as SNOMED, MED and MESH; Intranet concepts for the user interface construction (JAVA); sharing of knowledge between applications through a knowledge base of MLMs; software integration through standards of data interoperability (OLE2 and CORBA). The key-element that guarantees the integration between the different software modules and servers is a conceptual canonic model of the domain. This model contains the description of types of data and knowledge to describe the corporate database. The model is called canonic because it offers concepts that all other models are mapped into. A software infrastructure is responsible for the semantic integration. It consists of modules of FAQ (frequent asked queries), mapping of the local database schemas to the local conceptual model, implement as visions of the global canonic model), tools for distributed queries, and editors to write MLM. The glue between all this software components is performed in a CORBA model, where each of this modules is one CORBA object allowing for the construction of a distributed object environment. An interdisciplinary team (50 persons) with personnel from the Health Informatics Center and the Computer Science Department (medical informaticians, system analysts, software engineering experts, and nurses) is in charge of the design of this new HIS. Besides that an academic team (12 persons) from Computer Science (Intelligent Database Group) from the Computer Science Program of the Federal University of RGS are investigating particular research tasks in the overall process, such as implementation of a Common SQL request broker for the distributed environment. Presently the system is under implementation and the first prototype should be validated by the end of the year.

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